

RESEARCH DEPARTMENT

**TRANSMITTING AERIALS FOR THE CARMARTHEN
V.H.F. TELEVISION AND V.H.F. SOUND STATION**

Technological Report No. E-114/2
(1965/10)

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INTRODUCTION

The Carmarthen relay station came into operation on 15th March 1965. It provides a television and v.h.f. sound service to Carmarthen and Abergwili.

SUMMARY OF INSTALLATION

Site: The site is at Pen-lan Farm about $\frac{1}{2}$ mile (0.8 km) north of Carmarthen town centre, grid reference SN 412 213, height 450 ft (137 m) a.m.s.l.

Support Structure: The support structure consists of a 120 ft (37 m) square section self-supporting tower oriented with one side on a bearing of 72° ETN.

General Arrangement: See Fig. 1.

Band I

Channel: Channel 1 with vertical polarization is used. Both vision and sound carriers are offset -47.25 kc/s.

Aerial: The aerial¹ consists of two tiers each of one vertical $\lambda/2$ dipole mounted on a bearing of 180° ETN and spaced 8 ft 9 in. (2.67 m) from the tower axis. The inter-tier spacing is 1.0λ and the mean height is 88 ft (26.8 m) a.g.l. The tower side dimension at this height is 2 ft (0.61 m). The tower is screened by a single vertical 0.5 in. (1.3 cm) diameter rod fitted to the middle of the southerly face and running from the 66 ft (20 m) to 88 ft (26.8 m) level. There are independent main feeders to each dipole.

Power: A translator with an output power of 10 W is used.

Templet and Horizontal Radiation Pattern (h.r.p.) See Fig. 2 and Note 1.

Gain:	Mean intrinsic gain	3.3 dB
	<u>Deduct:</u> loss from possible misalignment	<u>0.2 dB</u>
	Mean net gain	3.1 dB
	<u>Deduct:</u> loss in main feeder (type UR 67)	1.4 dB
	network loss	<u>0.6 dB 2.0 dB</u>
	Mean effective gain	<u>1.1 dB</u>

Band II

Carrier Frequencies:	88.5 (Light), 90.7 (Third), 92.9 (Welsh Home) Mc/s.	
Aerial:	The aerial ¹ consists of two tiers each of two horizontal $\lambda/2$ dipoles mounted on bearings of 109° and 214° ETN, spaced 4 ft (1.22 m) from the tower axis and fed with equal co-phased currents. The inter-tier spacing is 0.65λ and the mean height is 113 ft (34.4 m) a.g.l. The tower side dimension at this height is 1 ft 3 in. (0.38 m). There are independent main feeders to each tier.	
Power:	A translator with an output power of 10 W is used for each programme.	
Templet and h.r.p.	See Fig. 3 and Note 2.	
Gain:	Mean intrinsic gain	1.5 dB
	<u>Deduct:</u> loss due to possible misalignment and distribution feeders	<u>0.3 dB</u>
	Mean net gain	1.2 dB
	<u>Deduct:</u> loss in main feeder (type UR67)	2.2 dB
	network loss	<u>0.9 dB 3.1 dB</u>
	Mean effective gain	<u>-1.9 dB</u>

Programme Links: Both television and sound programmes are obtained by direct pick-up of the transmissions from Wenvoe.

Notes:

1. The aerial design was based on a theoretical prediction of the h.r.p. of each tier assuming a cylindrical support mast electrically equivalent to the square tower section. This approximation gives reasonable accuracy since the mean tower cross-section is relatively small (0.092λ square).

2. The aerial design was based on a theoretical h.r.p. of the dipoles alone, neglecting the effects of the support mast and the dipole support booms. A more accurate h.r.p., which included the effect of the dipole support booms was obtained from measurements on a small-scale model mounted on a thin support pole. This was a reasonable approximation to the full-scale aerial, in view of the relatively small electrical size of the tower cross-section (0.116λ square) and the absence of horizontal screening rods.

REFERENCE

1. Detailed information on the construction and dimensions of the aerals is given on the following drawings prepared by BBC Planning and Installation Department.

PID 9067.2.1A Arrangement of aerals on 120 ft tower

PID 8732.2.3J Band I transmitting dipole

PID 8732.2.2J Band II transmitting dipole

CHS

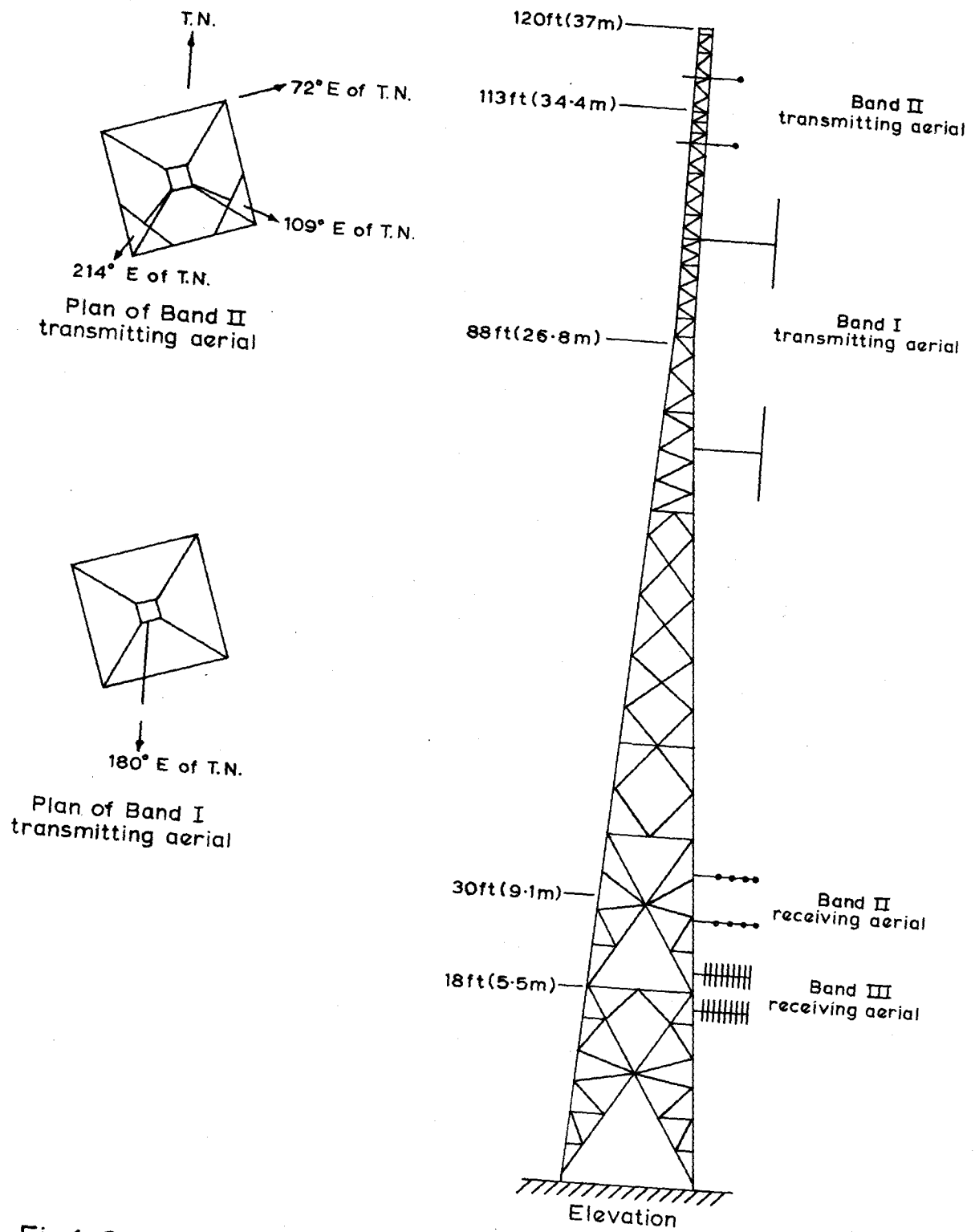


Fig.1 General arrangement of airtials on tower

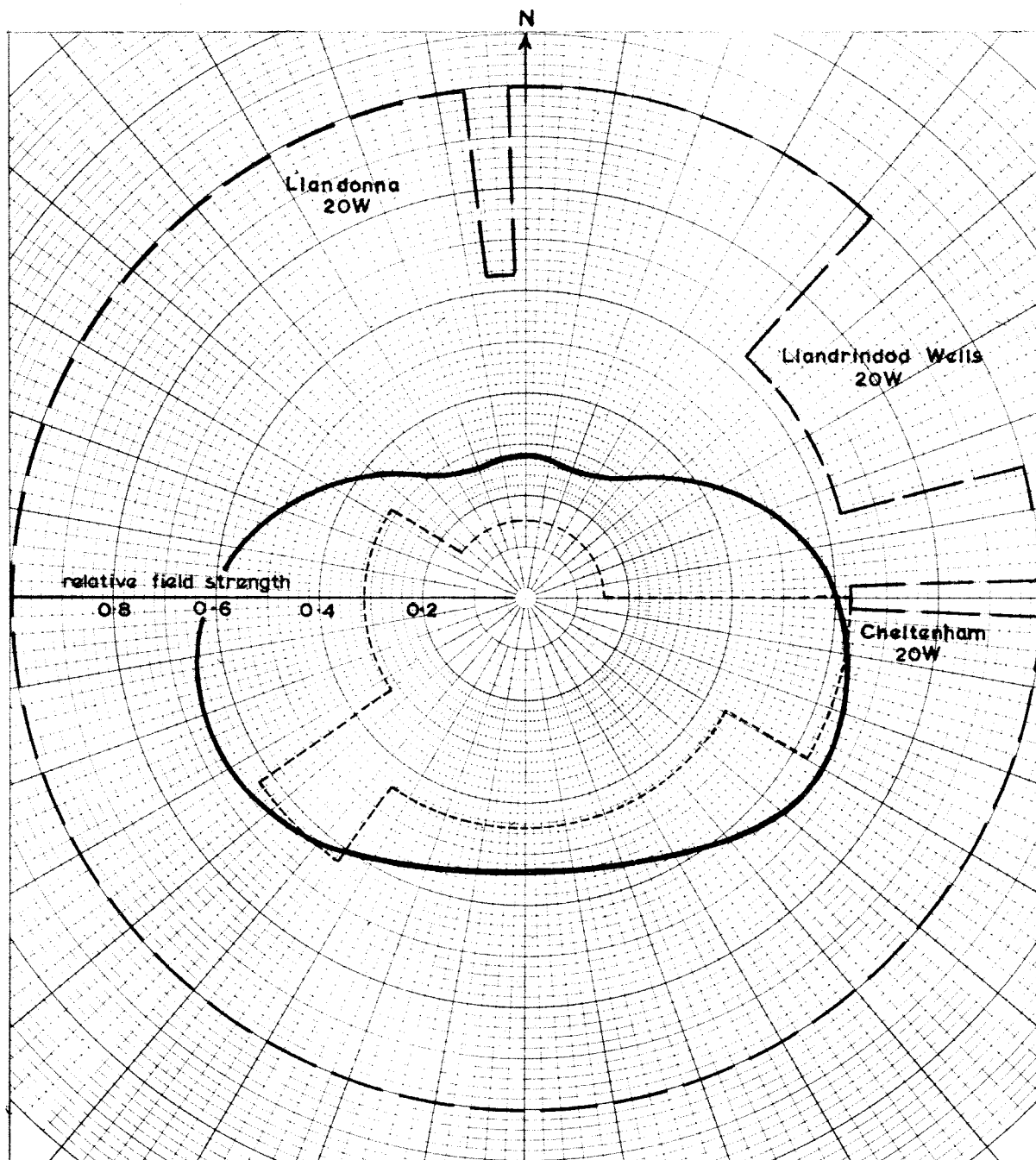


Fig.2. Band I templet and horizontal radiation pattern.

VERTICAL POLARIZATION

Channel 1 (Vision carrier 45.0 Mc/s, Sound carrier 41.5 Mc/s)

Mean effective gain 1.1 dB

Transmitter power 10W

Mean E.R.P. 12.9 W

—— Maximum permissible E.R.P.

----- Minimum desirable E.R.P.

Unit field corresponds to an E.R.P. of 50W

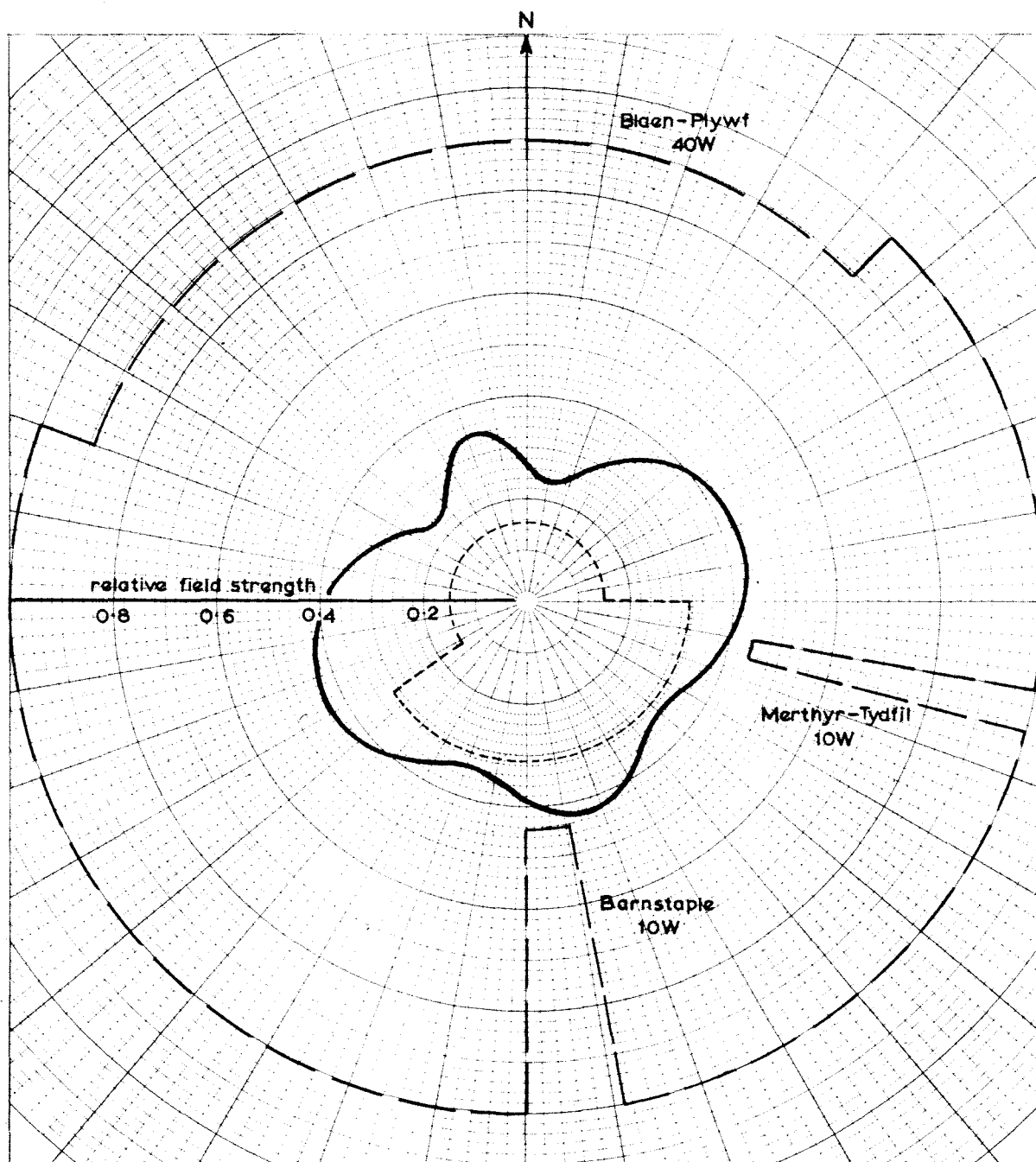


Fig. 3 Band II templet and horizontal radiation pattern.

HORIZONTAL POLARIZATION

88.5(Light), 90.7(Third), 92.9(Welsh Home), Mc/s

Mean effective gain -1.9 dB

Transmitter power 10W

Mean E.R.P. 6.5W

Unit field corresponds to an E.R.P. of 50W

—— Maximum permissible E.R.P.

----- Minimum desirable E.R.P.